

## Shiitake cultivation on sawdust

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Cultivation of shiitake mushroom using log takes one year at the least before the first harvest. One cycle of cultivation takes about 5 years which is a long payback period. Log cultivation is not fit for growers in the outskirts of urban districts since felling and delivering logs from remote woods is costly. In general, acquiring logs is increasingly difficult. These are some of the drawbacks of shiitake cultivation on logs. In addition, the growing cost of labor poses another problem in labor-intensive shiitake log cultivation.

**Shiitake cultivation on sawdust** has many **advantages** over the log cultivation method. More broad-leaved trees are available for use because making sawdust doesn't require logs of a certain size or width. The whole cultivation process can be mechanized reducing labor costs. Another advantage is a quick return on investment. You can harvest the first crop in 8-10 months. You can produce 2 to 2.5 times as many mushrooms as you can with the shiitake log cultivation. One **disadvantage** is that method produces more of low quality mushrooms. This problem can be overcome, however, by developing new strains and new cultivation technologies.

In Japan, spawn providers using mechanized facilities sell completely colonized and browned shiitake mushroom kits. Many Japanese shiitake growers produce mushrooms with these kits without the need for incubation and induction. China has long grown shiitake mushrooms on sawdust putting a great amount of dried shiitake on the international market.

One or two growers, even in suburbs, can easily cultivate shiitake with these shiitake kits. Indoor sawdust cultivation in winter can be profitable thanks to higher seasonal shiitake prices. Sawdust cultivation is expected to gain popularity based on a much shorter payback period, year-round availability, and current market trends favoring fresh mushrooms.

### ► Shiitake Production on Sawdust

The process of shiitake production on sawdust can be illustrated as follows: (See Figure 1).

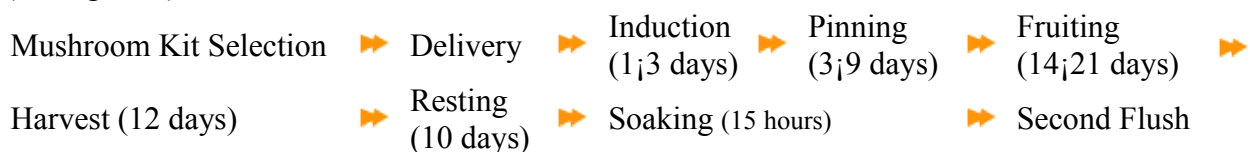


Figure 1. From Culture to Mushroom

### ► Preparation of the Growing Room



Figure 2. Outside a Shiitake Sawdust Growing Room

Because shiitake mushrooms develop not only on the top of the culture media but also on its sides, shiitake cultivation needs about a 3 times wider growing area than other mushrooms. Thus, building low cost per unit area growing rooms is essential. The pipe house is a good model.

When preparing growing room, cultivation time, growing medium size and cultivation size should be considered. The following example can be used as a reference for the preparation of a growing room

In terms of insulation, temperature, light and humidity control, air conditioning and the placing of cultivation shelves.

Figure 3. Inside a Shiitake Sawdust Growing Room

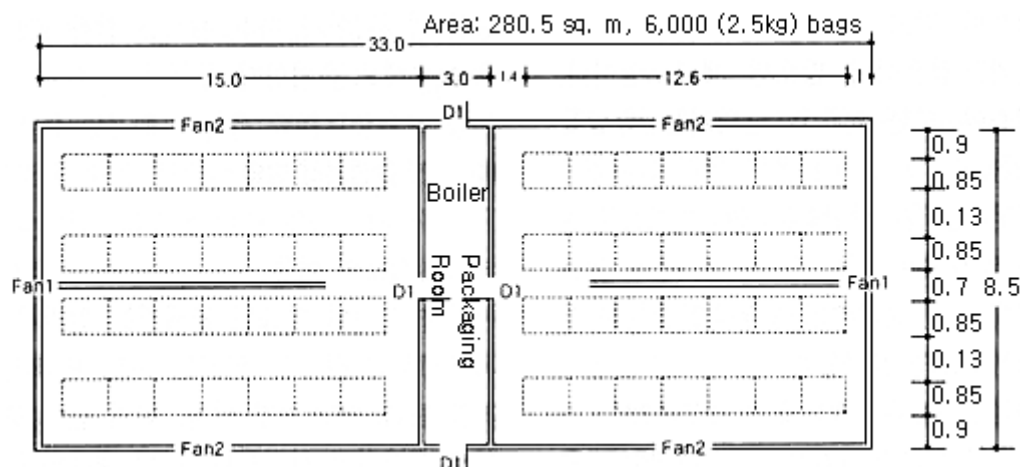


Figure 4. Example Lay out of Shiitake Sawdust Growing Room

### Details of the Growing Facilities

1. Floor covering: stones + agricultural film + styrofoam + heating and drain pipes + wire reinforced concrete
2. Roof covering: gunny sack + cashmere cotton + PE film + styrofoam + insulation covering + PE film + insulation covering
3. Wall and shade cloth: film + cashmere cotton + film + shade cloth
4. Cultivation shelf rack (3 rows by 6 shelves):  $12.6 \times 8 = 108 \text{ m}$
5. Supersonic humidifier: 8 units
6. Refrigerating equipment: a 10 HP unit and 4 coolers for a growing rooms of  $127.5\text{m}_2$ .
7. Ventilation fan 1 (2 units):  $1,000\text{m}_2/\text{hr}$
8. Ventilation fan 2 (4 units):  $300\text{m}_2/\text{hr}$
9. Heating: hot water boiler with  $20,000\text{kcal/hr}$  capacity

### Crop Management for Each Cultivation Stage

#### Mushroom Kit Selection



Figure 5. Primordia of Shiitake

Good incubation is most important for a successful cultivation as is the case for shiitake log cultivation. Before buying mushroom kits, check the following points to judge their quality.

#### **From colonization to maturity:**

Colonization-> coat (skin) formation -> bump formation-> browning-> metabolic fluid generation : Maturity (ready for primordial formation).

- Is the protective skin (coat) light brown?

(A protective skin flecked with many black specks indicates shiitake mycelia are weakened

by bacteria or too much fluid.)

- Are the formed primordia firm?
- Is the fluid left in the bag pink or black? (Black fluid proves the presence of bacteria.)
- Is the pH value of the media sufficiently low, ~4?
- Is the moisture of the media adequate?

(Moisture content increases due to metabolic fluid generation. *Refer to Figure. 6*)

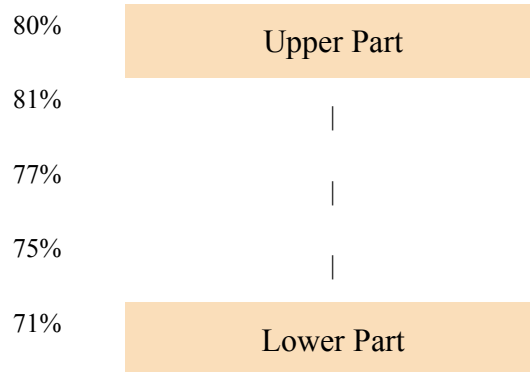


Figure 6. Moisture in the Sawdust Substrate

- Is the media well colonized with yellowish white mycelia?
- Is it infected with *Trichoderma* or other disease?

### Mushroom Kit Delivery

The culture media should be transported in a box to prevent damage. Physical shock during transport could serve as induction. Immature media or media that has been induced to early might result in deformed mushrooms. Hence, care should be taken in delivering mature media. Transport should not take too long and should not subject the media to temperatures lower than 5°C or higher than 30°C.

### Induction

#### **Transfer to a growing room:**



Figure. 7 Mushroom development after removal of infected part

Culture media completely colonized and mature are ready to fruit. Primordial formation is prompted by an abrupt temperature, gas concentration or air pressure change, or physical or electric shocks. In the case of shiitake cultivation on sawdust, induction in the first flush is normally accomplished by a cold shock without soaking. Transferring media from a warm room (20°C or above) to a cool growing room (12-18°C) serves to initiate induction.

### Bag Removal

You may remove the container either upon arrival of the mushroom kits or 3-4 days later. It's wise to remove them after pinning, especially in the winter season, when the culture media gets easily dry up due to heating of the growing house.

Bags can be complete or partially removed. Choose the method based on the state of the culture blocks and mushroom shelves. When you opt for partial removal, be careful of possible fungal contamination due to excess humidity.

When you spot dry patches of green mold infecting just the substrate surface, wash them away. But when green mold infestation is severe, cut away the infected parts and apply a fungicide like benomyl (Benlate).